

APPENDIX A - CLAIM AMENDMENTS

Serial No.: 10/625,232
Docket No.: 22413-14

1. (Currently Amended) In the surgical treatment of a human or animal body, a method of severing ~~tissue~~ a portion of diseased liver from the body without excessive bleeding, the method comprising:

providing a device, the device comprising an applicator having at least one face and including an array of four needles arranged in a rectangular pattern of two rows by two columns that define a central channel structured and arranged such that two of said four tissue-piercing needles are positioned on one side of a width of diseased liver tissue and two of said needles are arranged to be positioned on an opposite side of said width of diseased liver tissue, said width of tissue defining a planned incision line corresponding with said channel, said plurality of four tissue-piercing needles structured and arranged to be energizable together to deliver three-dimensional energy among and with a cross-flow across said plurality of tissue-piercing needles ~~each needle including a tissue-piercing distal tip, said array of needles arranged on said at least one face of the applicator, said applicator structured to be operably coupled to a source of electromagnetic energy;~~

positioning said array of four needles arranged in two rows by two columns such that two of said four tissue-piercing needles are positioned on one side of a width of diseased liver tissue and two of said needles are positioned on an opposite side of said width of diseased liver tissue such that said positioning defines a planned incision line corresponding with said channel ~~so that said array of needles surround a volume of tissue to be treated, said array of needles serving to confine and transmit the electromagnetic energy field three-dimensionally;~~

extending the tissue-piercing distal tips of said array of needles from said at least one face of the applicator into said ~~volume of~~ diseased liver tissue ~~to be treated at a point on~~

a-the planned incision line such that said four needles define a volume of liver tissue to be treated;
applying said electromagnetic energy three-dimensionally among said array of four needles into the volume of ~~the liver tissue to be treated~~ at said point on the planned incision line such that localized heating of said volume of liver tissue is achieved and blood vessels within said volume of liver tissue are coagulated;
removing the tissue-piercing distal tips of said array of needles from the volume of tissue to be treated;
advancing the applicator along the planned incision line in step-wise manner, extending the tissue-piercing distal tips of said array of needles into a subsequent volume of tissue to be treated along said planned incision line, and applying said electromagnetic energy three-dimensionally among said array of four needles into the volume of the tissue to be treated along said planned incision line until said ~~microwave~~-electromagnetic energy has been applied along the length of said incision ~~line~~line and blood vessels in the liver tissue along said planned incision line are coagulated; and
severing the diseased liver tissue from the body by incision along said planned incision line without excessive bleeding.

2. (Previously Presented) A method as claimed in claim 1 further comprising applying electromagnetic energy to the volume of the tissue to be treated for a time sufficient to raise the temperature of the tissue or organ by 20 to 30 degrees C.

3. (Currently Amended) A method of severing tissue from a human or animal body without excessive bleeding, the method comprising:

(a) inserting a device into tissue or a part of an organ to be treated, the device comprising an applicator structured to be operably coupled to a source of electromagnetic energy, said applicator including an array of four needles arranged in a rectangular pattern of two by two needles thereon, each needle having tissue-piercing means;

- (b) positioning the tissue-piercing means of said array of four needles into a desired depth of approximately 10 millimeters in a volume of the tissue to be treated defined by said four needles;
- (c) applying the electromagnetic energy to the desired depth of the volume of tissue to be treated to heat the tissue;
- (d) advancing the tissue-piercing means of said array of needles along the length of a planned incision line;
- (e) creating a heat-treated tissue volume as long as the length of the planned incision line, as deep as the desired depth, having a width that extends across the planned incision line ~~between two to four of the~~ said needles in said array arranged in said rectangular pattern of two by two needles, wherein the heat-treated tissue volume is centered on the planned incision line and further wherein blood vessels located within said tissue are coagulated to said desired depth ;
- (f) making an incision into the desired depth of the volume of tissue which has been heated along said planned incision line; and
- (g) severing the tissue or part of organ from the body by incision along said planned incision line without excessive bleeding.

4. (Previously Presented) The method as claimed in claim 3, in which the step of applying electromagnetic energy comprises heating said tissue by 20 to 30° C.

5. (Previously Presented) The method as claimed in claim 3, wherein said electromagnetic energy is provided at microwave frequency.

6. (Previously Presented) The method as claimed in claim 3, wherein said array includes at least one row of said needles.

7. (Previously Presented) The method as claimed in claim 6, further including a plurality of said rows of said needles, each said row having a plurality of said needles.

8. (Previously Presented) The method as claimed in claim 7, wherein each said row is straight.

9. (Previously Presented) The method as claimed in claim 8, wherein said rows are parallel to one another.
10. (Previously Presented) The method as claimed in claim 6, wherein said array includes two said rows of needles.
11. (Previously Presented) The method as claimed in claim 3, wherein said array of needles is rectangular.
12. (Previously Presented) The method as claimed in claim 3, wherein said needles are parallel with one another.
13. (Previously Presented) The method as claimed in claim 3, wherein said needles are the same length as one another.
14. (Previously Presented) The method as claimed in claim 3, wherein said needles are straight.
15. (Previously Presented) The method as claimed in claim 3, wherein positioning the tissue-piercing means of said array of needles to the desired depth of the volume of the tissue to be treated further includes actuating said applicator to cause said tissue-piercing means of said array of needles to extend into said desired depth of the volume of tissue.
16. (Previously Presented) The method as claimed in claim 15, wherein actuating said applicator to cause said tissue-piercing means of said array of needles to extend into said tissue includes extending said needle array in unison.
17. (Previously Presented) The method as claimed in claim 3 further comprising providing said applicator with a handle.
18. (Previously Presented) The method of claim 15 wherein extending the tissue-piercing means of said array of needles into a desired depth of a volume of the tissue to be treated further includes retracting said needles from said tissue .

19. (Previously Presented) The method as claimed in claim 1, wherein said array of needles includes at least one row of said array of needles.
20. (Previously Presented) The method as claimed in claim 19, further including a plurality of said rows of said needles, each said row having a plurality of said needles.
21. (Previously Presented) The method as claimed in claim 7, wherein each said row is straight.
22. (Previously Presented) The method as claimed in claim 21, wherein said rows are parallel to one another.
23. (Previously Presented) The method as claimed in claim 20, wherein said array includes two said rows of needles.
24. (Previously Presented) The method as claimed in claim 1, wherein said array of needles is rectangular.
25. (Previously Presented) The method as claimed in claim 1, wherein said needles are parallel with one another.
26. (Previously Presented) The method as claimed in claim 1, wherein said needles are the same length as one another.
27. (Previously Presented) The method as claimed in claim 1, wherein said needles are straight.
28. (Previously Presented) The method as claimed in claim 1, wherein extending the tissue-piercing distal tips of said array of needles into said volume of tissue further includes actuating said applicator to cause said tissue-piercing distal tips of said array of needles to extend into said tissue.
29. (Previously Presented) The method as claimed in claim 28, wherein said actuating said applicator to extend said tissue-piercing distal tips of said array of needles into said tissue includes extending said needle array in unison.

30. (Previously Presented) The method as claimed in claim 1 further comprising providing said applicator with a handle.

31. (Previously Presented) The method of claim 28 wherein extending the tissue-piercing distal tips of said array of needles into said volume of tissue further comprises retracting said needles from said tissue.

32. (Previously Presented) The method of claim 1 wherein said source of microwave energy comprises a waveguide for microwave transmission to said array of needles.

33. (Previously Presented) The method of claim 3 wherein positioning the tissue-piercing means of said array of needles into a desired depth of a volume of the tissue to be treated further comprises extending the tissue-piercing means into said desired depth of a volume of tissue to be treated.

34. (Previously Presented) The method of claim 33 wherein said array of needles are moveable with respect to said applicator and said extending is accomplished by actuating said needles with an actuator.

35. (Previously Presented) The method of claim 34 wherein said extending the tissue-piercing means of said array of needles into a desired depth of a volume of the tissue to be treated includes retracting said needles from said tissue.

36. (Canceled)

37. (Previously Presented) A method of surgically severing tissue from a human or animal body without excessive bleeding, the method comprising:

(a) providing an applicator structured to be operably coupled to a source of electromagnetic energy, said applicator having an array of needles thereon, each needle having a sharp tissue-piercing end;

(b) selecting in a tissue volume a planned incision plane with a planned incision depth and containing tissue which is prone to substantial bleeding upon incision thereinto;

- (c) at said planned incision plane, perforatingly inserting said sharp tissue-piercing ends of said needles to a planned insertion depth to pierce said tissue which is prone to bleeding;
- (d) applying said electromagnetic energy via said needles to said tissue volume to coagulate tissue in a coagulation volume, said coagulation volume containing said planned incision plane, straddling said incision plane and extending to the planned incision depth, in order to convert tissue in said coagulated volume from tissue prone to bleeding upon incision thereinto into tissue resistant to bleeding upon incision thereinto; and
- (e) making an incision to the planned incision depth along said planned incision plane to sever said tissue from the body without excessive bleeding.

38. (Previously Presented) A method as claimed in claim 37 which includes removing said needles from said coagulation volume before said step of making an incision.

39. (Previously Presented) A method as claimed in claim 37 which includes repeating steps (c) and (d) at a location advanced along said planned incision plane.

40. (Currently Amended) A method as claimed in claim 37 ~~which includes providing said array with said needles in at least two rows, and in which said perforatingly inserting said sharp tissue-piercing ends to a planned incision depth comprises inserting said a needle array of rows with said row~~two by two needles such that two needles straddling either side of said planned incision plane ~~with a needle of at least one row on one said of said planned incision plane and a needle of at least another row on the other side of said planned incision plane,~~ and in which the applying electromagnetic energy including applying said energy three dimensionally between needles across said planned incision plane.

41. (Previously Presented) A method as claimed in claim 37 which includes forming the coagulated volume as a substantially cuboid-shaped slice having a depth, width and height each greater than zero.

42. (Previously Presented) A method as claimed in claim 41 in which the slice has a width of about 2cm and is bisected by said planned incision plane.

43. (Previously Presented) A method as claimed in claim 37 which includes providing each needle of metal conducting material with a metal cylindrical conducting surface extending therealong, and in which said step of applying electromagnetic energy comprising providing a voltage to each needle so as to convert tissue into said coagulation volume by way of ablation energy transmitted into said tissue all of the way along said metal cylindrical conducting surfaces.

44. (Previously Presented) A method as claimed in claim 43 in which said step of applying electromagnetic energy comprising providing a voltage between needles in the array which are inserted into said tissue and located straddling the planned incision plane.